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(54) MOS-TYPE SOLID-STATE IMAGING APPARATUS AND IMAGE PICKUP METHOD THEREFOR

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a MOS-type solid-state imaging apparatus which can make the length of signal accumulation period and the accumulation start time of a light receiving element to be the same in whole pixels and in which the distortion of an image is not generated even if a moving object is taken in as a still image, which has an electronic shutter and which prevents the constitution of the pixel from becoming complicated and to provide the image pickup method.
SOLUTION: In a MOS-type solid-state imaging apparatus, multiple pixels having light receiving elements generating and outputting signals by photoelectric conversion, MOS transistors for amplification, which amplify the signals, and MOS transistors for switch, which are installed between the light receiving elements and the MOS transistors for amplification, are arranged in a matrix shape. A resetting MOS transistor which is

connected to the output parts of the light receiving elements are resets the output parts of the light receiving elements is installed.

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2.**** shows the word which can not be translated.

3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] The MOS mold solid state camera characterized by to prepare the MOS transistor for reset which was connected to the output section of said photo detector, and which considers the output section of said photo detector as reset at fixed potential in the MOS mold solid state camera which arranged two or more pixels which have the photo detector which generates a signal by photo electric conversion and is outputted, the MOS transistor for magnification which amplifies the signal, and said photo detector and the MOS transistor for a switch prepared between said MOS transistors for magnification in the shape of a matrix.

[Claim 2] The photo detector which generates a signal by photo electric conversion and is outputted, and the MOS transistor for magnification which amplifies the signal, In the MOS mold solid state camera which arranged two or more pixels which have said photo detector and the MOS transistor for a switch

prepared between said MOS transistors for magnification in the shape of a matrix, and constituted the picture element part The substrate of the 1st conduction type, and the 1st field of the 2nd conduction type formed into this substrate, By having the 2nd field of the 1st conduction type formed all over this 1st field, preparing opening without said 1st field in the bottom of said 2nd field, constituting said photo detector from said 1st field and said 2nd field, and changing the potential of said 1st field The MOS mold solid state camera characterized by having the transistor which resets the output of said photo detector which makes said 2nd field the output section.

[Claim 3] It is the image pick-up approach of an MOS mold solid state camera according to claim 1 or 2. Set the output of said photo detector of said all pixels as predetermined potential at coincidence, and the lightwave signal are recording by said photo detector is started. After inputting and holding the output of said photo detector of said all pixels to said transistor for magnification after predetermined time progress at coincidence, the output of the sequential aforementioned photo detector is outputted from said transistor for magnification for every line of said picture element part. The image pick-up approach of the

MOS mold solid state camera characterized by performing lightwave signal are recording of all pixels during the same period simultaneous.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention is concerned with a solid state camera and its image pick-up approach, and relates to a magnification mold MOS mold solid state camera without especially an image distortion, and its approach.

[0002]

[Description of the Prior Art] In recent years, as a solid state image sensor, a low power and the ease of circumference circuit unification attract attention, and the magnification mold MOS mold solid state camera is developed briskly. Hereafter, the outline of an MOS mold solid state image sensor is explained with an attachment explanatory view side. Drawing 6 is the outline block diagram of the MOS mold solid state camera of the conventional example. As shown in drawing 6 from the circumference circuit which controls the picture element part 22 which performs photo electric conversion, and this picture element part 22, and performs signal processing, the outline configuration of the MOS mold solid state camera 30 (only henceforth image pick-up equipment) is carried out.

[0003] A picture element part 22 consists of pixels 12 located in a line beside vertical (henceforth a train) (henceforth a line) in the shape of [of a predetermined number] a matrix. Each control line (only henceforth TG, RG,

and RS) of TG line, RG line, and RS line is connected from the line control circuit 24 for controlling these for every line, and in order to control these for every train, each control line (only henceforth SHS and SHR) of a SHS line and a SHR line is connected to these pixels 12 from the train control circuit 5.

[0004] the digital disposal circuit 7 by which the photo-electric-conversion signal acquired from a picture element part 22 is connected with the picture element part 22 -- noise rejection -- an AD translation is carried out and it is outputted. The line control circuit 24 and the train control circuit 5 are connected to the address control circuit 23. The address control circuit 23 is connected to the data control circuit 6. The digital disposal circuit 7 is connected to the level address selection circuit 8 and the data control circuit 6.

[0005] Drawing 7 is the block diagram showing the pixel in the MOS mold solid state camera of the conventional example. Since the signal-processing section 20 in the digital disposal circuit 7 connected to this with the pixel 12 surrounded and shown with a broken line is easy for explanation to drawing 7 , it is shown. In addition, in drawing 7 , in G, S shows the source and D shows a drain for the gate, respectively. The pixel 12 consists of four MOS transistors M1, M2, M3, and M4 (M1, M2, M3, and M4 are only said hereafter) and a photo detector PD

(only henceforth PD).

[0006] The P side of PD is grounded and the N side is connected to the source of M2. TG is connected to the gate of M2, the drain of M2 is connected to the source of M1, and the gate of M3, and these form Node SF. RG is connected to the gate of M1 and the drain of M1 is connected to the reference voltage line 15. The predetermined electrical potential difference VDD is impressed to the reference voltage line 15. The drain of M3 is connected to the reference voltage line 15, and the source of M3 is connected to the source of M4.

[0007] The gate of M4 is connected to RS and the output from a pixel 12 is outputted from the drain of M4. The drain of M4 is inputted into the signal-processing section 20, and is connected to each source of the drain of MOS transistor M5 (M5 is only said hereafter), and MOS transistors M6 and M7 (M6 and M7 are only said below) through Node OUT. The gate of M5 is connected to the reference voltage line 16, the predetermined electrical potential difference VB is given to predetermined timing, and the source of M5 is grounded.

[0008] The gate of M6 is connected to SHS, the drain of M6 is connected to the end of capacity CS, and the plus (+) edge of differential-amplifier DA (only

henceforth DA), and the other end of capacity CS is grounded. The gate of M7 is connected to SHR, the drain of M7 is connected to the end of capacity CR, and the minus (-) edge of DA, and the other end of capacity CR is grounded.

[0009] Next, signal extraction from the conventional pixel 12 is explained. Drawing 8 is drawing showing the timing of the control signal in the MOS mold solid state camera of the conventional example. Drawing 8 is referred to about a control signal. Although the control signal over the pixel of the 1st line and the pixel of the 2nd line in a picture element part 22 is shown in drawing 8 as an example, it is the same also to other lines. An axis of abscissa shows time amount. First, after reading 1 pixel of outputs from all the pixels 12 of the 1st line in a picture element part 22 at a time from the left to the digital disposal circuit 7 delivery and after that and outputting them to party part coincidence next, in order, this was repeated to the pixel 12 of a lower line, was applied to the pan which sends the output from all the pixels 12 of the 2nd line to a digital disposal circuit 7, and the signal of the 1 field was read.

[0010] Although the following explanation is explanation about one pixel, actuation with all the same pixels that constitute each line is performed. RG first connected to the pixel 12 of the 1st line is made into high potential, and Node SF

is set to an electrical potential difference VDD by setting M1 to ON. M4 will be turned on, if RS is made into high potential after making RG into low voltage and making M1 off. Since the fixed electrical potential difference VB is built over the gate of M5 and a fixed current flows, a source follower circuit is constituted from M3-M4-M5, and the electrical potential difference V1 which is 1 (potential of VDD) (threshold electrical potential difference of M3) appears in Node OUT. Then, if SHR is made into high potential, M7 will turn on and capacity CR will be charged by V1.

[0011] Next, after making SHR into low voltage and making M7 off, if TG is made into high potential, M2 will turn on and the potential of Node SF will change in proportion to the potential of a photo detector PD. And the electrical potential difference V2 of (potential proportional to potential of PD) - (threshold electrical potential difference of M3) appears in Node OUT. Then, if SHS is made into high potential, M6 will turn on and capacity CS will be charged by V2. Since capacity CS and CR has led to each input of the differential amplifier DA, the electrical potential difference of (V2-V1), i.e., (electrical potential difference proportional to the potential of PD), the electrical potential difference of - (potential of VDD), is obtained as the output.

[0012] By the approach to read the output signal from such a pixel, the output which is not related to the magnitude of the threshold electrical potential difference of M3 and dispersion of the threshold electrical potential difference of M3 in each pixel is obtained. After making SHS and RS into low voltage after making SHS into high potential between predetermined time, and turning OFF M6 and M4, only predetermined time makes RG and TG high potential at coincidence, turns ON M1 and M2, and sets Nodes SF and PD (the output side of a photo detector is also hereafter called PD) to the potential of VDD. Since TG serves as low voltage and M2 becomes off after PD is set to VDD, the lightwave signal generated by the light which carried out incidence to PD after it is accumulated in PD. The period when a lightwave signal is accumulated in PD of this pixel is after PD is set to VDD until TG becomes high potential in signal read-out actuation of the same line in the next field.

[0013] After signal read-out to the pixel 12 of the 1st line finishes, signal read-out to the following pixel 12 of the 2nd line is performed like the case of the 1st line, as mentioned above (see the timing chart of the 2nd line of drawing 8). Like the 1st line, the lightwave signal are recording period of the pixel of the 2nd line is after signal read-out of this pixel finishes and PD is set to VDD until TG becomes

high potential by read-out of the next field.

[0014]

[Problem(s) to be Solved by the Invention] By the way, although die length is the same, the gap will have produced the lightwave signal are recording period of the pixel of the 1st line, and the pixel of the 2nd line at start time. For example, if the line of a pixel reads the pixel of each line once one by one in those with 500, and 1/30 second, by vertical 1 spacing, a difference will be in the start time of lightwave signal are recording only for 1/30 second for 1/15000 second at the 1st line and the 500th line.

[0015] The difference in this lightwave signal are recording start time is seldom worried, when the photographic subject which is moving is picturized and people see as an animation, but some animations are incorporated as a still picture, and when image display is carried out, fault, like a profile is distorted arises. Especially this makes difficult application of the MOS mold solid state camera to the digital camera only for still pictures.

[0016] Then, this invention solves the above-mentioned technical problem, and sets it to an MOS mold solid state camera. It enables it to make the same the die length and its are recording start time of a signal are recording period of a photo

detector by all pixels. Also when incorporating the photographic subject which moves by this as a still picture, and it does not produce distortion of an image, it has electronic shutter ability and aims at offering the MOS mold solid state camera which moreover does not complicate the configuration of a pixel, and its image pick-up approach.

[0017]

[Means for Solving the Problem] As a means for attaining the above-mentioned purpose, the MOS mold solid state camera of this invention by claim 1 The photo detector which generates a signal by photo electric conversion and is outputted, and the MOS transistor for magnification which amplifies the signal, In the MOS mold solid state camera which arranged two or more pixels which have said photo detector and the MOS transistor for a switch prepared between said MOS transistors for magnification in the shape of a matrix It is going to offer the MOS mold solid state camera characterized by preparing the MOS transistor for reset which was connected to the output section of said photo detector, and which considers the output section of said photo detector as reset at fixed potential.

[0018] Moreover, the MOS mold solid state camera of this invention by claim 2 as a means for attaining the above-mentioned purpose The photo detector

which generates a signal by photo electric conversion and is outputted, and the MOS transistor for magnification which amplifies the signal, In the MOS mold solid state camera which arranged two or more pixels which have said photo detector and the MOS transistor for a switch prepared between said MOS transistors for magnification in the shape of a matrix, and constituted the picture element part The substrate of the 1st conduction type, and the 1st field of the 2nd conduction type formed into this substrate, By having the 2nd field of the 1st conduction type formed all over this 1st field, preparing opening without said 1st field in the bottom of said 2nd field, constituting said photo detector from said 1st field and said 2nd field, and changing the potential of said 1st field It is going to offer the MOS mold solid state camera characterized by having the transistor which resets the output of said photo detector which makes said 2nd field the output section.

[0019] Moreover, the image pick-up approach of the MOS mold solid state camera of this invention by claim 3 as a means for attaining the above-mentioned purpose It is the image pick-up approach of an MOS mold solid state camera according to claim 1 or 2. Set the output of said photo detector of said all pixels as predetermined potential at coincidence, and the

lightwave signal are recording by said photo detector is started. After inputting and holding the output of said photo detector of said all pixels to said transistor for magnification after predetermined time progress at coincidence, the output of the sequential aforementioned photo detector is outputted from said transistor for magnification for every line of said picture element part. It is going to offer the image pick-up approach of the MOS mold solid state camera characterized by carrying out during the same period simultaneous in lightwave signal are recording of all pixels.

[0020]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to a drawing. In addition, in the following explanation, the same reference mark is given to the same thing as the configuration of the conventional example, and the explanation is omitted.

[0021] (The 1st example) Drawing 1 is the outline block diagram of the MOS mold solid state camera by this invention. Drawing 2 is the block diagram showing the pixel in the 1st example of the MOS mold solid state camera by this invention. Drawing 3 is drawing showing the timing of the control signal in the 1st example of the MOS mold solid state camera by this invention.

[0022] The MOS mold solid state camera 1 of this invention shown in drawing 1 has the same configuration as the MOS mold solid state camera of the conventional example except having replaced with the address control unit 23 in the MOS mold solid state camera 30 of the conventional example mentioned above, having replaced the address control unit 3 with the line control unit 24, having replaced the line control unit 4 with the picture element part 22, having replaced the picture element part 2 with the pixel 12, and having used the pixel 10. In addition to the control signal line by which the line control circuit 4 is outputted from the line control circuit 24, it has each control line (only henceforth RPD and sound power level) of a RPD line and a sound power level line, and RPD is connected to the pixel 10 of each line in this example. The address control circuit 3 is controlling such a line control circuit 4.

[0023] MOS transistor M8 (M8 is only said hereafter) is newly added to the pixel 10 of the MOS mold solid state camera of this invention shown in drawing 2 to the pixel 12 of the conventional example. Here, about M8, the drain is connected to the reference voltage supply line 15, the gate is connected to RPD, and the source is connected to the N side of a photo detector PD. M8 is a transistor for reset which resets PD. In drawing 2 , in G, S shows the source and D shows a

drain for the gate, respectively.

[0024] In addition, explanation of the function of each MOS transistor operates M6 and M7 as a switch as a switch for a VDD set in M1 as a switch with which M2 sets the output from PD as an object for loads which M3 makes output M5 for M4 to OUT as a switch as an object for the amplifier of the potential of SF. The timing of the control signal supplied to a pixel 10 from each control line is shown in drawing 3 . Although the thing to the pixel 10 of the 1st line of a picture element part 2 and the pixel 10 of the 2nd line is shown as an example, same actuation is performed also to other lines so that it may mention later. An axis of abscissa shows time amount.

[0025] Hereafter, signal processing from the pixel 10 in this example is explained. First, RG of all the pixels 10 of a picture element part 2 is made into high potential, M1 is turned on, and the node SF of all the pixels 10 is set to the potential of VDD. Next, after making RG into low voltage and turning off M1, TG of all the pixels 10 is made into high potential, and M2 is turned on. Thereby, the electrical potential difference proportional to the potential of a photo detector PD to the photo detector PD of all the pixels 10 is transmitted to SF. Then, after making TG into low voltage and turning off M2, RPD of all the pixels 10 is made

into high potential, and M8 is turned on. Consequently, the photo detector PD of all the pixels 10 is set to the potential of VDD.

[0026] If RPD is made into low voltage and M8 is turned off after a photo detector PD is set to VDD, all the pixels 10 will start are recording of a lightwave signal from this to coincidence. That is, light carries out incidence to the photo detector PD of floating of all pixels, a carrier is generated, and a charge is accumulated in the N side of a photo detector PD. Since the period of this signal are recording is controlled to become time amount until TG of all the pixels 10 becomes high potential again at coincidence, the die length and start time of the signal storage time become the same also with all the pixels 10 after all.

[0027] The signal transmitted to all pixel 10 coincidence at Node SF is read one line at a time one by one like the conventional example after that. If RS of the pixel of the 1st line serves as high potential at the beginning and M4 turns on, since VB has started M5, the electrical potential difference of (electrical potential difference proportional to potential of PD) - (threshold electrical potential difference of M3) appears in Node OUT. If SHS is made into high potential after that and M6 is turned on, capacity CS will be charged on this electrical potential difference.

[0028] After making SHS into a low battery and turning off M6, if RG is made into high potential and M1 is turned on, Node SF will be set to the electrical potential difference of VDD, and the electrical potential difference of Node OUT will change to (potential of VDD) - (threshold electrical potential difference of M3). In order to charge capacity CR on this electrical potential difference, SHR is made into high potential and M7 is turned on. Since capacity CS and CR is connected to each input of the differential amplifier DA, the electrical potential difference of (electrical potential difference proportional to potential of PD) - (potential of VDD) is obtained as an output of DA. Since this serves as an output which is not related to dispersion in the threshold electrical potential difference of M3 for every pixel 10, it does not have the fixed pattern noise generated fixed every pixel 10.

[0029] If signal read-out of the pixel of the 1st line is completed, by the same approach, read-out and this will be repeated for the signal of the pixel of the 2nd line, and signal read-out of the 1 field will be performed. As explained above, also when incorporating the photographic subject which runs by this example since the lightwave signal are recording which received light to the same time amount also as all the pixels 10 is started, the lightwave signal accumulated in

the same time amount is collectively transmitted to Node SF and the signal is read from the pixel of every a party after that as a still picture, distortion of an image is not generated.

[0030] Moreover, in this example, since the transistor M8 for reset of a photo detector PD is unrelated to signal read-out actuation of each pixel line, to any timing under signal read-out, you may turn on and it may be turned off. Consequently, ON of M8 and OFF time amount can be adjusted, and the function of an electronic shutter can be realized. For example, in the case where all pixels are read in 1/30 second, if it does not reset again during the read-out period of all pixels after resetting the photo detector of all pixels once at the left end of the timing chart of drawing 3 , shutter speed is equivalent to 1/30 second. Moreover, what is necessary is to cancel the lightwave signal which reset the photo detector and was accumulated by then, 1/1000 second before the read-out period of all pixels expires, and to read only the lightwave signal brought together in the remaining time amount (for 1/1000 seconds), when realizing shutter speed for 1/1000 second, for example. If this function is used, it can incorporate as a still picture without blurring also with the photographic subject which moves at high speed.

[0031] (The 2nd example) Drawing 4 is the block diagram showing the pixel in the 2nd example of the MOS mold solid state camera by this invention. The pixel 11 in the MOS mold solid state camera 1 of this invention shown in drawing 4 is carrying out the same configuration as the pixel of an example 1, except that it replaces with the photo detector PD in the pixel 10 of the example 1 mentioned above, and the transistor M8 for reset, it changes into the control line RPD of M8 using the vertical mold NPN mold structure transistor T1 and the sound power level line is connected to T1. In this example, the MOS mold solid state camera 1 of an example is replaced with sound power level as line control, and RPD is used for it.

[0032] Here, it vertical mold NPN mold structure transistor T1 (T1 is only said hereafter) per explains. Drawing 5 is the sectional view of the photo detector in the 2nd example of the MOS mold solid state camera by this invention. In drawing 5 , in 32, an N type field and 35 show P well opening, and, as for an N type substrate and 33, 34 shows a depletion layer, as for P well field and 31. A photo detector (it is indicated as PD) is formed by the PN junction of P well field 33 in an N type substrate, and the N type field 31 currently formed in it.

[0033] Opening (P well opening 35) without P well is prepared in a part of being

[it]-under N type field 31 P well field 33. When the N type substrates 31 are [supply voltage and P well field 33] ground potential, the N type field of P well opening 35 all sets up the dimension W of this P well opening 35 so that it may become a depletion layer.

[0034] The N type substrate 32 is connected to the reference voltage power-source line 15, and VDD is supplied here. P well field 33 is connected to sound power level, and the N type field is connected to the source of M2. When sound power level is ground potential, the N type field 31 and the N type substrate 32 are separated by the depletion layer 34, and the optical carrier generated by the incidence of light is accumulated in the PN junction of the N type field 31 and P well field 33 (when it is at the drawing 4 (A) charge storage time).

[0035] On the other hand, if sound power level is set as middle extent of ground potential and the power-source potential VDD (in the case at the time of the drawing 4 (B) reset), since the reverse bias of the N type substrate 32 and P well field 33 will decrease, the depletion layer 34 in P well opening 35 dissociates, the N type field 31 and the N type substrate 32 flow, an N type field serves as the power-source potential VDD, and a photo detector is reset.

[0036] Therefore, in this example, if sound power level is made into predetermined potential instead of replacing with sound power level RPD in the timing chart of drawing 3 explained in the 1st above-mentioned example, and making RPD into high potential, it turns out that the same signal drawing as an example 1 can be performed. That is, also when incorporating the photographic subject which runs by this example since the lightwave signal are recording by light-receiving is started to the same time amount, and all the pixels 11 transmit collectively the lightwave signal accumulated in the same time amount to Node SF and read the signal from the pixel of every a party after that as a still picture, distortion of an image is not generated.

[0037] Moreover, in this example, since the reset action in a photo detector PD and the transistor T1 which has the function which resets this is unrelated to signal read-out actuation of each pixel line, to any timing under signal read-out, you may turn on and it may be turned off. Consequently, it is the same as that of an example 1 that ON of T1 and OFF time amount can be adjusted, and the function of an electronic shutter can be realized.

[0038] Although it consisted of five MOS transistors per pixel, and there were many an MOS transistors and only that part needed to make area of a photo

detector smaller than the pixel of the conventional example in the 1st example, in this example, this point can also be improved, area of a photo detector can be made equivalent to the conventional example, and the fall of sensibility to light can be suppressed. In addition, although vertical mold NPN transistor T1 was explained to the example above, it may replace with this and a vertical mold PNP transistor may be used.

[0039]

[Effect of the Invention] As explained above, the MOS mold solid state camera of this invention by claim 1 The photo detector which generates a signal by photo electric conversion and is outputted, and the MOS transistor for magnification which amplifies the signal, In the MOS mold solid state camera which arranged two or more pixels which have said photo detector and the MOS transistor for a switch prepared between said MOS transistors for magnification in the shape of a matrix By having prepared the MOS transistor for reset which was connected to the output section of said photo detector and which considers the output section of said photo detector as reset at fixed potential It enables it to make the same the die length and its are recording start time of a signal are recording period of a photo detector by all pixels. Also when incorporating the

photographic subject which moves by this as a still picture, it is effective in not producing distortion of an image and being able to offer the MOS mold solid state camera which has electronic shutter ability.

[0040] As explained above, moreover, the MOS mold solid state camera of this invention by claim 2 Moreover, the photo detector which generates a signal by photo electric conversion and is outputted and the MOS transistor for magnification which amplifies the signal, In the MOS mold solid state camera which arranged two or more pixels which have said photo detector and the MOS transistor for a switch prepared between said MOS transistors for magnification in the shape of a matrix, and constituted the picture element part The substrate of the 1st conduction type, and the 1st field of the 2nd conduction type formed into this substrate, By having the 2nd field of the 1st conduction type formed all over this 1st field, preparing opening without said 1st field in the bottom of said 2nd field, constituting said photo detector from said 1st field and said 2nd field, and changing the potential of said 1st field By having the transistor which resets the output of said photo detector which makes said 2nd field the output section It enables it to make the same the die length and its are recording start time of a signal are recording period of a photo detector by all pixels. Also when

incorporating the photographic subject which moves by this as a still picture, and it does not produce distortion of an image, it has electronic shutter ability and is effective in the ability to offer the MOS mold solid state camera which moreover does not complicate the configuration of a pixel.

[0041] As explained above, moreover, the image pick-up approach of the MOS mold solid state camera of this invention by claim 3 It is the image pick-up approach of an MOS mold solid state camera according to claim 1 or 2. Set the output of said photo detector of said all pixels as predetermined potential at coincidence, and the lightwave signal are recording by said photo detector is started. After inputting and holding the output of said photo detector of said all pixels to said transistor for magnification after predetermined time progress at coincidence, the output of the sequential aforementioned photo detector is outputted from said transistor for magnification for every line of said picture element part. To coincidence lightwave signal are recording of all pixels and by having been made to carry out during the same period It enables it to make the same the die length and its are recording start time of a signal are recording period of a photo detector by all pixels. Also when incorporating the photographic subject which moves by this as a still picture, it is effective in not

producing distortion of an image and being able to offer the image pick-up approach of an MOS mold solid state camera of having electronic shutter ability.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the outline block diagram of the MOS mold solid state camera by this invention.

[Drawing 2] It is the block diagram showing the pixel in the 1st example of the MOS mold solid state camera by this invention.

[Drawing 3] It is drawing showing the timing of the control signal in the 1st example of the MOS mold solid state camera by this invention.

[Drawing 4] It is the block diagram showing the pixel in the 2nd example of the MOS mold solid state camera by this invention.

[Drawing 5] It is the sectional view of the photo detector in the 2nd example of the MOS mold solid state camera by this invention.

[Drawing 6] It is the outline block diagram of the MOS mold solid state camera of the conventional example.

[Drawing 7] It is the block diagram showing the pixel in the MOS mold solid state camera of the conventional example.

[Drawing 8] It is drawing showing the timing of the control signal in the MOS mold solid state camera of the conventional example.

[Description of Notations]

1 [-- Line control circuit,] -- An MOS mold solid state camera, 2 -- A picture

element part, 3 -- An address control circuit, 4 5 [-- Level address selection circuit,] -- A train control circuit, 6 -- A data control circuit, 7 -- A digital disposal circuit, 8 10 [-- A reference voltage supply line 16 / -- Reference voltage supply line,] -- A pixel, 11 -- A pixel, 12 -- A pixel, 15 20 [-- A line control circuit, 30 / -- An MOS mold solid state camera, 31 / -- An N type field, 32 / -- An N type substrate, 33 / -- P well field, 34 / -- A depletion layer, 35 / -- P well opening.] -- The signal-processing section, 22 -- A picture element part, 23 -- An address control circuit, 24